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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/762,769	11/04/2002	Rupert George Fray	PM 276653	7890

909 7590 09/09/2003

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EXAMINER
IBRAHIM, MEDINA AHMED

ART UNIT	PAPER NUMBER
1638	13

DATE MAILED: 09/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/762,769	FRAY ET AL.	
	Examiner	Art Unit	
	Medina A Ibrahim	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *24 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-2 and 4-6, in Paper No. 12 filed on 6/24/03 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). The requirement is made FINAL.

Claim 3 is cancelled.

Claims 1-2 and 4-6 are pending and are under consideration.

The request for status under 37 CFR 1.42 filed on 04/11/02 is GRANTED.

Specification

2. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
(e) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.

(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(f) BRIEF SUMMARY OF THE INVENTION.
(g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(h) DETAILED DESCRIPTION OF THE INVENTION.
(i) CLAIM OR CLAIMS (commencing on a separate sheet).
(j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

Specifically, the specification is objected to for its omission of headings (e), (f), (g), and (h).

Information Disclosure Statement

3. The listing of references in the specification, on page 6, is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Objections

4. Claims 1-2 are objected to because of the following informalities: "synthesise" is not a US-recognized term. It is suggested that the term be changed to ---synthesize---.

5. In claim 5, " genome" after plant should be deleted; and ---in its genome---, should inserted after "containing", for clarification.

6. In claim 6, "A" should be changed to ---The--- because the claim refers to a previous claim.

Drawings

7. The drawings filed on 02/13/2001 are approved by the Examiner.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-2 and 4-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 2 are indefinite in the recitation of " introducing into the genome of the plant by transformation the ability to synthesize a N-acyl-L-homoserine lactone" because what has been introduced into the plant and what is encompassed by "the ability to synthesize a N-acyl-L-homoserine lactone" is unknown. Appropriate correction to more clearly define the metes and bounds of the claims is required.

Claim 2 is indefinite because what is encompassed in "analogue of N-acyl-L-homoserine lactone" is unknown. The specification fails to define " an analogue" of a N-acyl-L-homoserine lactone, and hence the metes and bounds of the claim are unclear. Also, the phrase "capable of competing.....receptor sites therein" does not make sense, and hence what is sought for protection is unclear. The specification fails to define the metes and bounds of the claim.

Claim 4 is indefinite for depending upon cancelled claim 3. Also, "the gene" lacks antecedent basis.

Claim 5 is indefinite because "the response regulator thereof" implies that there is only one response regulator for the N-acyl-L-homoserine lactone, and it is unclear if

there is only one. Appropriate correction to more clearly define the metes and bounds of the claim is required.

Claim 6 is indefinite because "A genome as claimed in claim 5" lacks antecedent basis because claim 5 is drawn to a recombinant plant genome rather than "a genome". It is suggested that "genome" is replaced with ---recombinant plant----.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11 Claims 1-2 and 4-6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claims are drawn to a method of protecting a plant against bacterial infection and/or virus infection transmitted by bacteria by transformation the ability to synthesize a N-acyl-L-homoserine lactone or an analogue thereof, and a recombinant plant comprising a gene construct for expression of N-acyl-L- homoserine lactone and/or the response regulator thereof in a plant, which the expressed N-acyl-L- homoserine lactone is targeted to plant chloroplasts. The claims also encompass expressing specific N-acyl-L-homoserine genes in a transgenic plant.

Applicant provides guidance for a method of expressing bacterial genes encoding an N-acyl-L- homoserine lactone in transgenic tobacco plants (Examples 1-3). Applicant teaches that the acyl-L-homoserine lactone (AHL) diffuses out from intact leaves and root surfaces of the transgenic plants signaling to nearby bacteria. Applicant has shown that the presence of AHLs in the vicinity of roots of said transgenic plants induced bioluminescence in a recombinant *E.coli* carrying lux response regulator (luxR). Leaves of the transgenic plant expressing N-acyl-L- homoserine lactone were also tested for their ability to complement *civI*, *carI*, and *luxI* mutants of *Chromobacterium violaceum, Erwinia cartovora, and Psuedomonas fischeri,* respectively (Examples 4-6). Applicant teaches assays for restoring virulence activity to *Erwinia carotovora* and p.aureofaciens mutants by inoculating leaves of transgenic plants expressing AHLs with said mutants having reduced virulence in their natural host plant, showing that the pathogen can perceive and respond to the N-acyl-L-homoserine lactone produced by the transgenic plants ((Examples 9 and 10).

Applicant has not shown that the production of N-acyl-L-homoserine lactone in a transgenic plant actually protects the plant against bacterial infection and/or virus infection transmitted by bacteria as claimed in claims 1-2 and 4. Applicant has not evaluated any disease resistance activity by said transformed plants.

While microbes, especially bacteria, are known to regulate developmental processes through release of signal chemicals, the state of the prior art provides limited information with respect to the use of such chemical signals for plant disease control. For example, Robson et al (TIBETCH, vol. 15, pp. 458-464, 1997) discuss bacterial N-

acyl-homoserine lactone dependent signally, genes encoding bacterial N-acyl-homoserine lactone, and their potential biotechnological applications as follows: "(t)he basic simplicity of these signaling pathways is appealing from a biotechnological prospective, but this apparent simplicity should not mask the fact that the ways in which they contribute to overall physiology in the cognate hosts may be subtle and complex". The cited reference further states "(u)nderstanding of the underlying genetics and biochemistry of AHL-based signally is developing rapidly, but the precise nature of the molecular interaction between signal and receptor, and between receptor and promoter sequence, remains to be elucidated" (page 464, column 1, under Summary and future prospects). On page 461, the cited reference points out that the work on AHL regulatory system is at an early stage, and the reference provides evidence that other physiological and environmental factors are involved in the activation of virulence factors. Because the production of virulence factors by pathogen is controlled by other physiological and environmental factors, it is not predictable that the expression of a single gene encoding an N-acyl-L-homoserine lactone can be used to control bacterial and virus diseases transmitted by bacteria, absent further guidance.

In addition, no transgenic plant having resistance against bacterial and/or virus infection transmitted by bacteria as a result of expressing a N-acyl-L- homoserine lactone, a response regulatory or an analogue thereof has been disclosed.

In the event that Applicant provides evidence that expression of bacterial N-acyl-L-homoserine lactone in a transgenic plant will provide protection from bacterial infection, a scope of enablement rejection will be maintained for all the claims for the

following reasons: because not all bacterial species produce N-acyl-L-homoserine lactone for pathogenicity (as evidenced by Applicant's own specification, paragraph bridging pages 1 and 2), one skilled in the art would not be able to use N-acyl-L-homoserine lactone to protect plants from infection by any and all bacteria, without undue experimentation. In addition, neither the instant specification nor the prior art has taught how to recognize virus infection transmitted by bacteria from virus infection not transmitted by bacteria, and therefore, one would not be able to protect plants from a disease that is not recognizable.

Therefore, given the limited guidance in the specification for the claimed method, wherein bacterial and viral infections are controlled through AHL production by the plant, the state of the prior art with respect to the use of bacterial signal chemicals to control bacterial and viral infection in plants, the nature of the invention which is complex, the lack working examples, and the unpredictable nature of the invention, one skilled in the art would not be able to practice the claimed invention, without undue experimentation. See In re Wands 858 F.2d 731, 8USPQ2nd 1400 (Fed. Cir. 1988).

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by KLAUS DUERING (DE 195 48 301, 27 Feb. 1997, provided by Applicant). This prior art

reference is published in German language. However, Abstract attached to this Office action, and the International Preliminary Examination Report (IPER) of parent application PCT/GB99/02652 have been relied upon for English language translation.

The claims are drawn to a method for protecting a plant against bacterial infection comprising introducing into the genome of the plant by transformation the ability to synthesize a N-acyl-homoserine lactone or an analogue thereof capable of competing with N-acyl-L-homoserine lactone secreted by infecting bacteria for N-acyl-homoserine lactone receptor sites therein.

KLAUS teaches a method of protecting plants against bacterial infection by inhibiting the pheromone acylated homoserine lactone regulated processes in bacteria such as *Erwinia corotovora,* the method comprising expressing antibodies against acylated pheromone homoserine lactone in a transgenic plant. Given that the claims are indefinite for the reasons set forth in the 112, 2nd paragraph rejection above, all claim limitations are taught by the cited reference.

Remarks

14. Claims 4-6 are deemed free of the prior art, given that the prior art does not teach or reasonably suggest a method of protecting a plant against bacterial infection and/or virus infection transmitted by bacteria by expressing a gene encoding N-acyl-L-homoserine lactone or a response regulator thereof in the plant and transgenic plants comprising said gene.

15. No claim is allowed.

16. Papers related to this application may be submitted to Technology Sector 1 by facsimile transmission. Papers should be faxed to Crystal Mall 1, Art Unit 1638, using

fax number (703) 308-4242. All Technology Sector 1 fax machines are available to receive transmission 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform with the Notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The Examiner can normally be reached Monday-Thursday from 8:30AM to 5:30PM and every other Friday from 9:00AM to 5:00PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Dr. Amy Nelson, can be reached at (703) 306-3218.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0196.

9/6/03
Mai

Medina A. Ibrahim